RELIABLE NPAC SMS WIDE AREA NETWORK

The Lockheed Martin Team will provide a reliable wide area network (WAN) that connects LSPs to the NPAC and Primary Data Center facility in Chicago to the Backup/Disaster Recovery Data Center in Tarrytown NY. Highlights of Lockheed Martin's WAN include:

- Two POPs (Chicago and Tarrytown) for LSP access to both the primary and backup/disaster recovery processors

- Several supported WAN link types

- Secure Internet access for convenience and flexibility

- Ample bandwdith and expansion.

PROVEN COMPUTING ENVIRONMENT AND ARCHITECTURE

The NPAC SMS computing environment is shown in Exhibit 2. A LAN will be located at the primary NPAC facility in Chicago, IL. Attached to the LAN are the NPAC SMS server, LAN File Server, network management workstations, NPAC staff user workstations, network access servers. The LAN supports both dial-in and Internet access.

Reliability and Availability

The Lockheed Martin Team's NPAC SMS System will provide very high levels of reliability and availability, including:

- 99.9% reliability of NPAC SMS including all functionality and data integrity

- 24 by 7 NPAC SMS and interface operations

- 99.9% availability of NPAC SMS interfaces

- 9 hours or less of NPAC SMS unscheduled downtime

- Restoration of receiving, processing, and broadcasting updates within 24 hours after a disaster

- 1 hour or less NPAC SMS mean-time-to-repair

- Full functionality within 48 hours after a disaster.
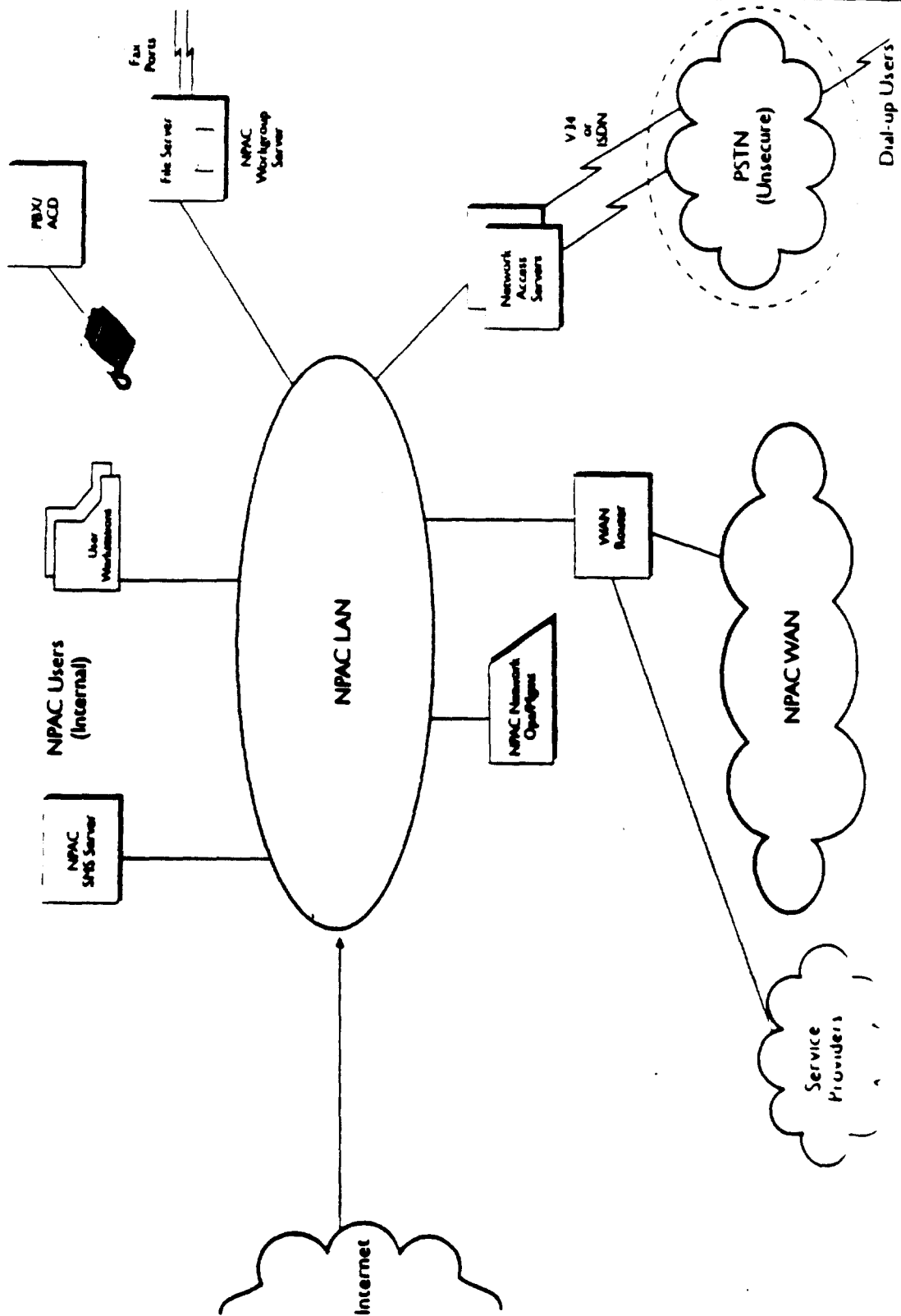
NPAC COMPUTING ENVIRONMENT & LAN

Exhibit 2. NPAC Computing Environment and LAN.

Capacity and Performance

The Lockheed Martin Team's NPAC/SMS solution provides superior capacity and performance, including:

- Engineered to serve 30 LSPs with 10 LSPs at initial turnup

- Engineered to support over 2,500,000 ported telephone numbers through 5 years

- Designed to accommodate 30% churn of accumulated records

- Designed to furnish 60 second or less response time for broadcasting updates to all LSPs

- Designed to provide 3 second or less response time for sending an acknowledgment to user requests.

Expandability

The Lockheed Martin Team NPAC SMS architecture can readily grow to accommodate increased LSPs serving Chicago LATA 358, statewide expansion of Illinois, NPAC SMS expansion to neighboring States, and expansion of NPAC SMS functionality. This can easily occur by:

- Adding additional WAN POPs and links

- In-box scaling of NPAC SMS servers by adding additional logical CPU boards, RAM, and hard disk storage

- Adding extra servers, if required

- Expanding the LAN infrastructure — servers, workstations, printers, etc.

- Expanding the PBX — trunks, lines, etc.

Connectivity and Security

The NPAC SMS system architecture offers several secure methods of connecting and accessing the NPAC/SMS using the protocol stacks shown in Exhibit 3. Both the mechanized SOA to NPAC SMS and NPAC SMS to Local SMS interfaces to the NPAC/SMS are supported by connecting to either of the two WAN POPs (Chicago or Tarrytown). Both of these interfaces are CMISE+IP based.

Layer	Mechanized Interface	NPAC System Support (Internal Only)	Function
	CMIP Agent Server	Unix daemons, Net mgmt	User
7	CMISE, ACSE, ROSE	FTP, smtp, telnet, X, DNS, NFS, X.400, lpr, SNMP	Application
6	ANSI T.224		Presentation
5	ANSI T.224		Session
4	TCP, RFC1006, TP0	TCP/UDP	Transport
3	IP	IP	Network
2	PPP, FR, MAC	PPP, MAC	Link
1	DS-1/3, DS-0 x n, ISDN, V.34	DS-1/3, DS-0 x a, ISDN (backup)	Physical
	Exhibit 3. NPAC/SMS Primary Network Protocol Stacks.		

In addition, a substantial number of NPAC processes and operations may be performed manually by authorized service provider-based personnel (remote users) via a highly secure, fully authenticated, remote access facility. At the service provider's option, remote users may use the same IP-based communications links supporting the mechanized interfaces, or use a separate access facility. The facility may be dedicated (another IP-based link) or dialup (ISDN or V.34 dialback) using the PPP protocol.

Finally, the NPAC SMS includes a proven robust highly secure architecture that ensure security while enabling authorized Internet access.

NPAC SMS APPLICATION SOFTWARE

The basic function of the NPAC SMS is to facilitate changes of telephone routing information in the Local Service Provider's networks. The NPAC SMS receives update notifications from the Local Service Providers twenty-four hours a day, seven days a week, mainly through the SOA to NPAC SMS Interface Upon validation of the routing information, the NPAC SMS broadcasts the updated routing information to all Local Service Providers via the NPAC SMS to Local SMS interfaces.

The NPAC SMS supports all aspects of customer service, including: the ability to determine the status of all system data and functions, synchronization of routing information, and actions supporting conflict resolution. Authorized NPAC users have easy access to the data and system capabilities required to support the Local Service Providers.

Support of automated processes requires robust SMS administration and configuration capabilities The NPAC SMS allows authorized NPAC users to easily monitor and manage every aspect of network configuration data, service data, Local Service Provider data, and subscription data. Service Providers have the ability to view and manage their own service and, subscription using graphical user interfaces similar to NPAC authorized users.

Because of the number of Local Service Providers using the NPAC SMS, the design includes extensive event tracking capabilities. The NPAC SMS timestamps and logs update events and system events The system also tracks performance and system utilization metrics. The NPAC SMS tracks all events and messages by entity.

Security is an important NPAC SMS design component. The NPAC SMS controls access to and management of data and system functions with auditable, identification, and authentication mechanisms

The strong authentication and data encryption security functions serve as the foundation for the user's ability to administer their data and use the enhanced reporting functions.

Reporting capabilities allow NPAC users and Service providers to access and understand system performance, system utilization, and billing. The capabilities of the system include reports for all system and update events, system usage, and metrics by Local Service Provider. The reporting capabilities include generation of bills against resource accounting information. The NPAC SMS features many predefined reports and supports ad hoc user queries.

NPAC OPERATIONS

Lockheed Martin has been successfully managing the 800 NASC for the 800 Service Industry for over two years. During this time, they have performed to satisfy requirements that are very similar to those required for LNP in the state of Illinois. Lockheed Martin's service approach results in evenhanded service, quality, and customer satisfaction thus ensuring on-going NPAC operations, providing the highest level of service, meeting or exceeding client expectations, and operating in an open and ethical manner while protecting and preserving the security of customer data. These principles will be incorporated in the operation of the NPAC. NPAC performance against built-in Quality Assurance standards, audits and feedback from NPAC users and the Selection Committee will be tracked. The key components of Lockheed Martin's NPAC service are illustrated in Exhibit 4.

NPAC Functions

The NPAC must perform a wide array of functions, including data center operations, network management, application software support, user support, facilities management, user training, and document management. The main functions of Lockheed Martin's NPAC are shown in Exhibit 5. These are as follows:

NPAC Management

The function includes responsibility for the day to day management of the NPAC and NPAC SMS system

User Support Services

This function ensures that the users are able to use the NPAC SMS system effectively to establish ported number records and obtain provisioning. Tasks include:

- User problem resolution

- User access assistance

- Ported number record security, access, input and modification assistance

- Scheduled system unavailability notification

- Service and network data table administration

- Numbering Plan Area (NPA) Split/Mass Change administration

-7-

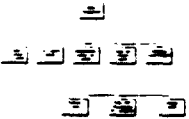# LOCKHEED MARTIN NPAC SERVICE COMPONENTS

	• Professional office facilities for NPAC operations with extensive built-in security and disaster recovery provisions, and ample room for growth
	• A reliable, functional NPAC SMS WAN, highly availabe hardware platform, and NPAC SMS application software to quickly and accurately activate subscription and download routing information
	• NPAC organization that emphasizes service quality
	• A local area network (LAN) at the NPAC providing secure access to all system facilities, at every workstation, for approved NPAC users
	• A tracking system to provide on-line support for help requests, problem tracking, and reporting
	• A sophisticated EXECUTONE voice communications system that is proven in NASC operations, with 1-800 service to provide responsive user access to the NPAC support staff
	• NPAC operation that meets all requirements, ICC operational with proven support systems and procedures
	• Training of NPAC SMS users, reinforcing the NPAC's role as the visible, neutral, evenhanded administrator
Performance Standards	• Responsive performance standards and procedures, including monitoring and regular quality assurance training

Exhibit 4. NPAC Service Components

NPAC ONGOING OPERATIONS

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                    │    NPAC      │
                    │  Management  │
                    └──────┬───────┘
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│ Quality  ││User Support││Administrative.││System and││ Training and │
│Assurance ││ Services  ││ Services and ││ Software ││Documentation │
│and Control││          ││  Facilities  ││ Support  ││              │
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                    │ Network  │      │  NPAC SMS    │    │ Software │
                    │ Control  │      │Administration│    │ Support  │
                    │          │      │and Operations│    │          │
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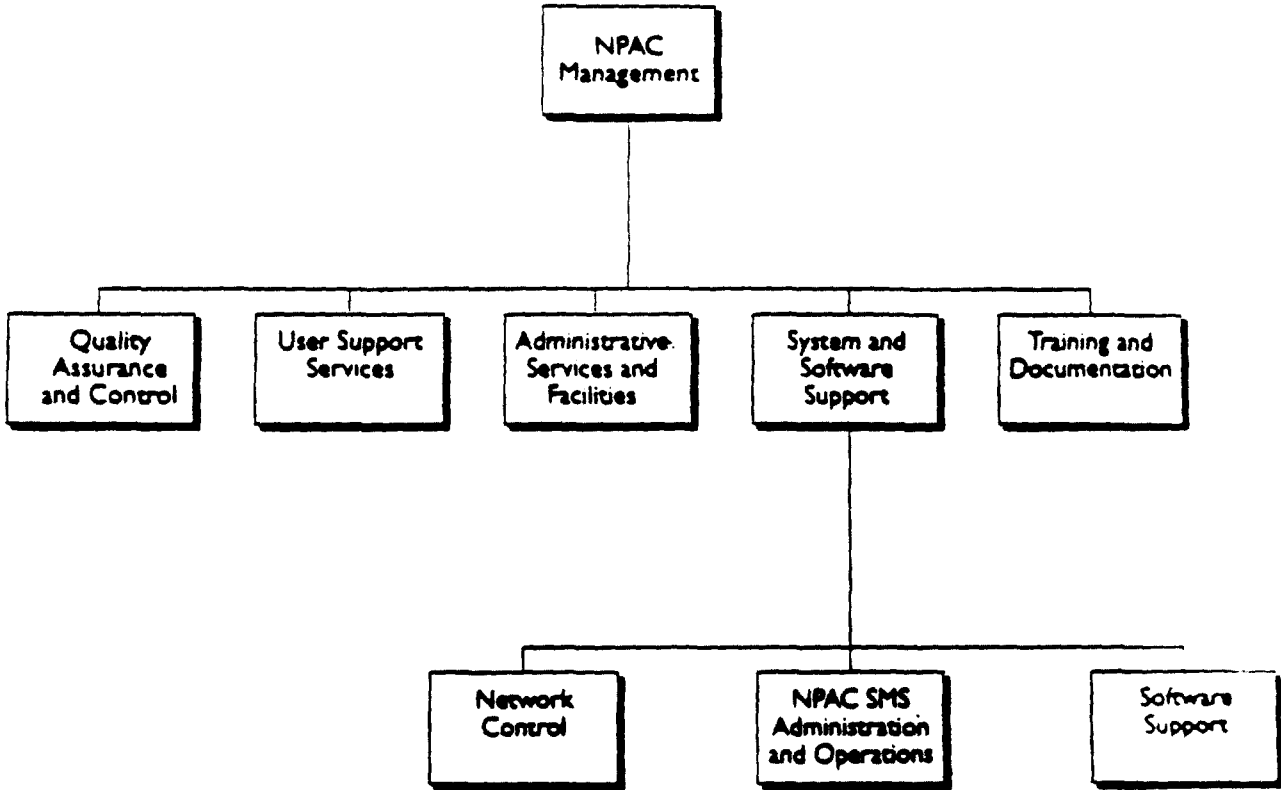
Exhibit 5. NPAC Ongoing Operations

- Software acceptance /New release testing

- New software release notification.

System and Software Support

System and software support functionality is focused on the creation and maintenance of an effective operational environment for NPAC operations and on resolving or coordinating resolution of all user or NPAC SMS problems pertaining to system availability or technical communications problems. Tasks include:

- Network Control

- NPAC SMS System Administration and Operations

- Software Support.

Administrative Services and Facilities

The Administrative Services and Facilities function includes the following tasks:

- Secretarial, clerical, administrative support, and office management services

- Human Resource

- Purchasing, leasing for NPAC internal operations

- Facility management

- Accounts payable and receivable

- Billing and adjustments.

Training and Documentation

Effective training in the operation and use of the NPAC SMS System and in NPAC services is a key factor in the acceptance of the NPAC by the Local Number Portability service community. To meet this need, the Lockheed Martin Team will:

- Develop and maintain training curriculum

- Develop training material in accordance with users needs

- Deliver training to NPAC users and internal staff

- Provide course schedules and registration information

- Track and act upon user training and documentation feedback

- Enhance and maintain training materials